PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	David B. Duperray
For	:	DISTORTION / EFFICIENCY ADAPTATION IN A VARIABLE DATA RATE RADIO TRANSMITTER
Serial No.	:	10/562,133
Filed	:	December 23, 2005
Art Unit	:	2614
Examiner	:	Lana N. Le
Att. Docket	:	US 30186 US2
Confirmation No.	:	5554

APPEAL BRIEF

Customer No. 65913

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Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed on April 16, 2009.

I. REAL PARTY IN INTEREST

The party in interest is Koninklijke Philips Electronics N.V., by way of an Assignment recorded at Reel 017413, frame 0642.

II. RELATED APPEALS AND INTERFERENCES

Following are identified any prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal:

NONE.

III. STATUS OF CLAIMS

Claims 1-12 are on appeal.

Claims 1-12 are pending.

No claims are allowed.

Claims 1-12 are rejected.

No claims are canceled.

IV. STATUS OF AMENDMENTS

All Amendments have been entered into the record.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter recited in claim 1 relates to a communications method comprising obtaining unwanted intermodulation distortion products (IM3 products: paragraph [0020], line 12) from an amplifier; measuring the intermodulation distortion

products to obtain intermodulation distortion product measurements (IM3 level: paragraph [0020], line 15); determining whether amplifier linearity is within an acceptable range based on the intermodulation distortion product measurement and a desired data rate (targeted EVM, paragraph [0026], line 1); and controlling the amplifier to reduce output signal distortion for data rates higher than the desired data rate but not for data rates below the desired data rate (paragraph [0027], lines 1-6).

The subject matter recited in claim 7 relates to a communications apparatus comprising: an amplifier that produces unwanted intermodulation distortion products (IM3 products: paragraph [0020], line 12); means for measuring the intermodulation distortion products to obtain an intermodulation distortion product measurement (IM3 level: paragraph [0020], line 15); means for determining whether amplifier linearity is within an acceptable range based on the intermodulation distortion product measurement and a desired data rate (targeted EVM, paragraph [0026], line 1); and means for controlling the amplifier to reduce output signal distortion for data rates higher than the desired data rate but not for data rates below the desired data rate (paragraph [0027], lines 1-6).

The subject matter recited in claims 2 and 8 relates to adjusting amplifier linearity to fall within said acceptable range (paragraph [0026], lines 3-9).

The subject matter recited in claims 3 and 9 relates to determining an acceptable error vector magnitude (EVM, paragraph [0018], lines 3-8) for the desired data rate; determining a corresponding desired third-order output intercept point value

(OIP3, paragraph [0014], line 2); and adjusting at least one amplifier control signal in response to the desired third-order output intercept point value (paragraph [0023], lines 3-7).

The subject matter recited in claims 4 and 10 relates to receiving the intermodulation distortion products through a leakage path (amplifier linearity control path 105: paragraph [0020], lines 5-6).

The subject matter recited in claim 5 relates to transforming a received signal from the time domain to the frequency domain (FFT 115, paragraph [0020], last line).

The subject matter recited in claim 11 relates to wherein said means for measuring the intermodulation distortion products further comprises an FFT block (FFT 115, paragraph [0020], last line).

The subject matter recited in claim 6 relates to using an IFFT operation (IFFT 113, paragraph [0003], lines 3-5) to obtain the unwanted intermodulation distortion products.

The subject matter recited in claim 12 relates to an IFFT block (IFFT 113, paragraph [0003], lines 3-5) that obtains the unwanted intermodulation distortion products.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

A. Claims 1-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2006/0240786 to Liu (hereinafter "Liu") in view of U.S. Patent 7,116,951 to Nagode (hereinafter "Nagode"), and further in view of U.S. Patent 5,574,990 to Flanagan (hereinafter "Flanagan").

VII. ARGUMENT

A. Rejection of Claims 1-12 Under 35 U.S.C. §103(a)

The Final Office Action dated February 9, 2009 rejects claims 1-12 under 35 U.S.C. § 103(a) as being unpatentable over Liu in view of Nagode, further in view of Flanagan.

1. Independent Claims 1 and 7

a. Liu, Nagode, and Flanagan Fail to Disclose, Teach, Or Suggest Use of Unwanted Intermodulation Distortion Products

Independent claims 1 and 7 recite the following subject matter: "**unwanted intermodulation** distortion products" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

First, page 2 of the Office Action alleges that paragraph [0019] of Liu discloses this subject matter. Appellant respectfully submits that the cited section of Liu is silent regarding the claimed subject matter. Instead of disclosing "**unwanted**

intermodulation distortion products," Liu discloses a "digital pre-distortion linearization technique" in the cited paragraph.

Second, page 2 of the Office Action alleges that amplifier element 116 in Liu discloses this subject matter. Appellant respectfully submits that paragraph [0019] of Liu is silent regarding amplifier element 116. Liu only describes this element in paragraph [0015], referring to it as the power amplifier of Fig. 2 and does not disclose any information regarding unwanted intermodulation.

Third, the recited "**unwanted intermodulation** distortion products" are clearly different from any distortion found in Liu's power amplifier. As defined by paragraph [0005] of the published specification for this application, intermodulation products are created by the multiple tones, becoming interferer tones for the information tones and degrading the overall signal quality of the Orthogonal Frequency Division Multiplexed (OFDM) signal. Thus, intermodulation tones of this type would not occur in Liu's system because Liu does not use OFDM.

Nagode and Flanagan fail to remedy the deficiencies of Liu regarding unwanted intermodulation distortion products. Nagode, as disclosed on line 17 of col. 4, for example, deals with amplitude distortion instead of intermodulation distortion. Flanagan's predistortion technique also compensates for amplitude distortion as disclosed, for example, in line 4 of Flanagan's abstract.

b. Liu, Nagode, and Flanagan Fail to Disclose, Teach, Or Suggest Measurement of Intermodulation Distortion Products

Independent claims 1 and 7 further recite the following subject matter: "**measuring** the intermodulation distortion **products**" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

First, on page 2, the Office Action alleges that paragraph [0014] of Liu discloses this subject matter. As described above, Appellant respectfully submits that Liu does not disclose "intermodulation distortion **products**." More specifically, while Liu's "intermodulation distortion" involves only an upper sideband and lower sideband, the claimed intermodulation distortion products occur on an OFDM system in which information is transmitted on numerous subcarriers. Thus, intermodulation products are created by multiple tones on the OFDM system, a process that could not occur in Liu's system, which does not use OFDM. Moreover, Appellant respectfully submits that paragraph [0014] lacks measurement of intermodulation distortion products.

Second, the Office Action alleges that paragraph [0045] of Liu discloses this subject matter. As with paragraph [0014], this section of Liu is silent regarding any measurement of intermodulation distortion products. In addition, because paragraph [0045] only refers to an AM-PM distortion characteristic of a power amplifier, Appellant respectfully submits that Liu would not measure products associated with OFDM in a power amplifier.

Nagode and Flanagan fail to remedy the deficiencies of Liu regarding measurement of unwanted intermodulation distortion products. Nagode, as disclosed on line 17 of col. 4, for example, deals with amplitude distortion instead of intermodulation distortion. Flanagan's predistortion technique also compensates for amplitude distortion as disclosed, for example, in line 4 of Flanagan's abstract.

c. Liu, Nagode, and Flanagan Fail to Disclose, Teach, Or Suggest Range Determination of Amplifier Linearity

Independent claims 1 and 7 further recite the following subject matter: "determining whether amplifier **linearity** is within an acceptable **range** based on the intermodulation distortion product **measurement** and a **desired data rate**" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

Regarding this subject matter, the Office Action applies the same paragraphs as for "**measuring** the **intermodulation** distortion **products**." Appellant respectfully submits that, in addition to lacking the recited measurement, paragraphs [0014] and [0045] of Liu clearly do not disclose the above-quoted subject matter. In particular, Liu does not disclose, suggest, or teach determination of an acceptable range and making such a determination on the basis of both measurement of intermodulation distortion products and a desired data rate.

Nagode and Flanagan fail to remedy Liu's lack of range determination of amplifier linearity. Nagode, as disclosed on line 17 of col. 4, for example, deals with amplitude distortion, but lacks any disclosure of an acceptable range of amplifier

linearity. Flanagan's predistortion technique is also silent regarding any determination of an acceptable range of amplifier linearity.

d. Liu, Nagode, and Flanagan Fail to Disclose, Teach, Or Suggest Rate-Dependent Control of an Amplifier

Independent claims 1 and 7 further recite the following subject matter: "controlling the amplifier to reduce output signal distortion for data rates **higher** than the desired data rate but not for data rates **below** the desired data rate" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 2, the Office Action correctly concedes that Liu does not teach this subject matter. The Office Action then attempts to remedy this admitted deficiency in Liu by applying the teachings of Nagode. In particular, the Office Action relies upon lines 53-67 of col. 3 in Nagode.

Appellant respectfully submits that the cited section of Nagode fails to remedy the deficiencies of Liu. First, because Nagode deals with "amplitude modulation distortion," Nagode's distortion would not resemble the claimed output signal distortion, caused by intermodulation distortion products in OFDM subcarriers. Second, Nagode does not teach a threshold, instead reciting that a transmitter "may accept even higher amplitude modulation data rates." Appellant respectfully submits that this teaching does not define a threshold data rate for distortion reduction.

On page 2, the Office Action correctly concedes that "Liu and Nagode do not disclose reducing output signal distortion not for data rates below the desired data

rate." The Office Action then attempts to remedy the admitted deficiencies of Liu in view of Nagode by applying the teachings of Flanagan. In particular, the Office Action relies upon lines 40-45 of col. 1 in Flanagan.

Appellant respectfully submits that Flanagan fails to remedy the deficiencies of Liu in view of Nagode. As described above, Nagode does not disclose a threshold data rate. Flanagan is just as deficient, only disclosing that "noise enhancement is not severe for typical voice and low-speed data applications." Flanagan is completely silent regarding the concept of setting a threshold data rate, by which an amplifier is controlled to reduce distortion "for data rates **higher** than the desired data rate but not for data rates **below** the desired data rate."

e. Conclusion

As described in detail above, Liu, Nagode, and Flanagan fail to disclose, teach, or suggest a number of elements recited in independent claims 1 and 7. Accordingly, Appellant respectfully submits that independent claims 1 and 7 are allowable over Liu, Nagode, and Flanagan.

2. Claims 2 and 8

Claims 2 and 8 recite the following subject matter: "**adjusting** amplifier linearity to fall within said acceptable **range**" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 3, the Office Action alleges that paragraph [0045] of Liu discloses this subject matter. Appellant respectfully disagrees. In particular, paragraph [0045] of Liu is completely silent regarding an acceptable range of linearity. Thus, Liu cannot adjust amplitude linearity to fall within an acceptable range, because no such range appears in Liu.

Flanagan and Nagode fail to remedy the deficiencies of Liu. As described above, neither Flanagan nor Nagode discloses an acceptable range of amplifier linearity.

Consequently, Appellant respectfully submits that claims 2 and 8 are allowable over the cited references. In addition, claim 2 depends from independent claim 1 and claim 8 depends from independent claim 7. Thus, Appellant respectfully submits that claims 2 and 8 are also allowable on the basis of their respective dependencies from allowable independent claims.

3. Claims 3 and 9

Claims 3 and 9 recite the following subject matter: "determining an **acceptable error vector magnitude** for the desired data rate; determining a corresponding desired third-order output **intercept point value**; and adjusting at least one **amplifier control signal** in response to the desired third-order output intercept point value" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 3, the Office Action alleges that paragraph [0060] of Liu discloses this subject matter. In response, Appellant respectfully submits that this section of Liu is clearly deficient. First, Liu is entirely silent regarding an acceptable error vector magnitude for a desired data rate. Second, while Liu discloses a "third order nonlinear coefficient of the transconductance," a "third order input leading cross transconductance," and a "third order output leading cross transconductance," Appellant respectfully submits that none of these values are equivalent to the recited third order **intercept point value**.

An intercept point value, as depicted in Fig. 3 of the current specification, is a value [OIP3] that varies in inverse proportion to a relevant measure for signal quality, the error vector magnitude [EVM]. Thus, as disclosed in paragraph [0018] of the current specification, low EVM, corresponding to high signal quality, requires high OIP3, while high EVM, corresponding to low signal quality, requires only low OIP3.

Appellant respectfully submits that such relationships are not true for the cited section of Liu, particularly as the Office Action fails to identify a particular "third order" term as equivalent to the recited third order intercept point value (OIP3). Moreover, Liu is also silent regarding adjustment of any amplifier control signals.

Flanagan and Nagode fail to remedy the deficiencies of Liu because Flanagan and Nagode are silent regarding third order intercept point values. Thus, Appellant respectfully submits that claims 3 and 9 are allowable over the cited references. In addition, claim 3 depends from independent claim 1 and claim 9 depends from

independent claim 7. Therefore, Appellant respectfully submits that claims 3 and 9 are also allowable on the basis of their respective dependencies from allowable independent claims.

4. Claims 4 and 10

Claims 4 and 10 recite the following subject matter: "a **leakage** path" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 3, the Office Action alleges that paragraph [0111] of Liu discloses this subject matter. However, paragraph [0111] is silent regarding a leakage path, describing three parts of an in-band signal pre-distortion processing unit instead.

Flanagan and Nagode fail to remedy the deficiencies of Liu because Flanagan and Nagode are silent regarding leakage paths. Thus, Appellant respectfully submits that claims 4 and 10 are allowable over the recited references. In addition, claim 4 depends from independent claim 1 and claim 10 depends from independent claim 7. Therefore, Appellant respectfully submits that claims 4 and 10 are also allowable on the basis of their respective dependencies from allowable independent claims.

5. Claims 5 and 11

Claim 5 recites the following subject matter: "transforming a received signal from the **time** domain to the **frequency** domain" (emphasis added). Apparatus claim 11 recites similar subject matter: "an **FFT** block," where "FFT" refers to a Fast Fourier Transformation, a way to transform a received signal from the **time** domain to the

frequency domain. Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 3, the Office Action alleges that paragraph [0072] of Liu discloses this subject matter. While paragraph [0072] of Liu does describe "AC thermal resistance defined in frequency domain," Liu is silent regarding conversion of a received signal from the time domain to the frequency domain. Moreover, Liu lacks a FFT block to perform such a conversion.

Flanagan and Nagode fail to remedy the deficiencies of Liu because Flanagan and Nagode are silent regarding an FFT. Thus, Appellant respectfully submits that claims 5 and 11 are allowable over the cited references. In addition, claim 5 depends from independent claim 1 and claim 11 depends from independent claim 7. Therefore, Appellant respectfully submits that claims 5 and 11 are also allowable on the basis of their respective dependencies from allowable independent claims.

6. Claims 6 and 12

Claims 6 recites the following subject matter: "using an **IFFT** operation to obtain the unwanted intermodulation distortion products" (emphasis added). Claim 12 recites similar subject matter: "an **IFFT** block that obtains the unwanted intermodulation distortion products" (emphasis added). Appellant respectfully submits that Liu, Nagode, and Flanagan, alone or in combination, fail to disclose, teach, or suggest this subject matter.

On page 3, the Office Action alleges that paragraph [0014] of Liu discloses this subject matter. However, paragraph [0014] is entirely silent regarding an Inverse Fast Fourier Transformation, an operation which transforms a signal from the frequency domain to the time domain. Moreover, this section of Liu does not disclose, suggest, or teach an IFFT block.

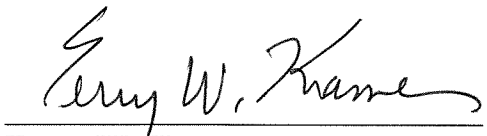
Flanagan and Nagode fail to remedy the deficiencies of Liu because Flanagan and Nagode are silent regarding IFFT. Thus, Appellant respectfully submits that claims 6 and 12 are allowable over the cited references. In addition, claim 6 depends from independent claim 1 and claim 12 depends from independent claim 7. Therefore, Appellant respectfully submits that claims 6 and 12 are also allowable on the basis of their respective dependencies from allowable independent claims.

B. Conclusion

For at least the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-12 are in condition for allowance. For at least the above reasons, Appellant respectfully requests that this Honorable Board reverse the rejections of claims 1-12.

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our Deposit Account Number 50-0578 and please credit any excess fees to such Deposit Account. Should there be any remaining issues that could be readily addressed over the telephone; the Exaimner is asked to contact the agent overseeing the application file, David Cordeiro, of NXP Corporation at (408) 474-9057.

Respectfully submitted,
KRAMER & AMADO, P.C.



April 17, 2009
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VIII. CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1. (Previously Presented) A communications method comprising:

obtaining unwanted intermodulation distortion products from an amplifier;

measuring the intermodulation distortion products to obtain intermodulation distortion product measurements;

determining whether amplifier linearity is within an acceptable range based on the intermodulation distortion product measurement and a desired data rate; and

controlling the amplifier to reduce output signal distortion for data rates higher than the desired data rate but not for data rates below the desired data rate.

2. (Previously Presented) The method of claim 1, further comprising:

adjusting amplifier linearity to fall within said acceptable range.

3. (Previously Presented) The method of claim 2, wherein adjusting amplifier linearity further comprises:

determining an acceptable error vector magnitude for the desired data rate;

determining a corresponding desired third-order output intercept point value; and

adjusting at least one amplifier control signal in response to the desired third-order output intercept point value.

4. (Previously Presented) The method of claim 1, further comprising:

receiving the intermodulation distortion products through a leakage path.

5. (Previously Presented) The method of claim 4, wherein measuring the intermodulation distortion products further comprises:

transforming a received signal from the time domain to the frequency domain.

6. (Previously Presented) The method of claim 1, further comprising:

using an IFFT operation to obtain the unwanted intermodulation distortion products.

7. (Previously Presented) A communications apparatus comprising:

an amplifier that produces unwanted intermodulation distortion products;

means for measuring the intermodulation distortion products to obtain an intermodulation distortion product measurement;

means for determining whether amplifier linearity is within an acceptable range based on the intermodulation distortion product measurement and a desired data rate; and

means for controlling the amplifier to reduce output signal distortion for data rates higher than the desired data rate but not for data rates below the desired data rate.

8. (Previously Presented) The apparatus of claim 7, further comprising:

means for adjusting amplifier linearity to fall within said acceptable range.

9. (Previously Presented) The apparatus of claim 8, wherein said means for adjusting amplifier linearity further comprises:

means for determining an acceptable error vector magnitude for the desired data rate;

means for determining a corresponding desired third-order output intercept point value; and

means for adjusting at least one amplifier control signal in response to the desired third-order output intercept point value.

10. (Previously Presented) The apparatus of claim 7, further comprising:

a leakage path through which the intermodulation distortion products are received.

11. (Previously Presented) The apparatus of claim 10, wherein said means for measuring the intermodulation distortion products further comprises an FFT block.

12. (Previously Presented) The apparatus of claim 7, further comprising:

an IFFT block that obtains the unwanted intermodulation distortion products.

IX. EVIDENCE APPENDIX

A copy of the following evidence 1) entered by the Examiner, including a statement setting forth where in the record the evidence was entered by the Examiner, 2) relied upon by the Appellant in the appeal, and/or 3) relied upon by the Examiner as to the grounds of rejection to be reviewed on appeal, is attached:

NONE.

X. RELATED PROCEEDINGS APPENDIX

Copies of relevant decisions in prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal are attached:

NONE.